APPENDIX D

Status of Fisheries in the Lower Boise River

IDAHO FISH & GAME
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Philip E. Batt / Governor
Stephen P. Mealey / Director

February 18, 1997

Mr. Steve West, Administrator
Division of Environmental Quality
Boise Regional Office
1445 North Orchard Street
Boise, ID 83706-2239

RE: Letter of December 31, 1996 Requesting Information on Status of Fish Populations in Boise River Drainage

Dear Mr. West:

The Idaho Department of Fish and Game (IDFG) is responding to the Division of Environmental Quality (DEQ) information request about the current status of fish populations in the lower Boise River mainstem and tributaries and Lake Lowell. We understand this knowledge is critical for the process of preparing Total Maximum Daily Load (TMDL) allocations for water quality limited segments. To summarize, the questions posed to us by the (DEQ) in the December 31, 1996 letter were:

1) Do cold water biota currently exist in the water quality limited segments in the Boise River watershed?

2) Are any salmonids known to spawn in the water quality limited segments in the Boise River watershed?

3) Do warm water biota currently exist in the water quality limited segments in the Boise River watershed?

4) Are the warm water biota, cold water biota, or salmonid spawning uses impaired in the water quality limited segments?

5) For those uses that are impaired in the lower Boise River drainage and Lake Lowell, what are the primary causes of impairment for each use (i.e. lack of habitat, temperature, toxins, flow, sediment...)?

6) The Water Quality Standards and Wastewater Treatment Requirements provide numerical criteria to support aquatic life

uses for temperature, water column dissolved oxygen, intergravel dissolved oxygen, turbidity, and ammonia. For those aquatic life uses that you believe are impaired by other factors, can you recommend target in stream conditions, such as percent surface fines or suspended sediment level, that if achieved would correct the impairment?

At a January 14, 1997 meeting attended by DEQ and IDFG staff, and Lower Boise River WAG participants, two additional questions arose for IDFG. They were:

7) What are the IDFG's goals for fish populations and fisheries in water quality limited segments of the Boise River drainage below Lucky Peak? For Lake Lowell?

8) What additional information needs exist if any that could help in this determination for water quality limited segments of the Boise River below Lucky Peak? Lake Lowell?

We'll attempt to answer your questions separately for the Boise River drainage and Lake Lowell. Fish and Game also believes it is appropriate to include a brief discussion of mountain whitefish (*Prosopium williamsoni*) since many questions have arisen from Lower Boise River WAG members regarding its general biology and behavior.

Mountain Whitefish

Whitefishes are members of the family Salmonidae which also includes trouts, chars, salmons, and graylings. Mountain whitefish are widely distributed over the western United States in many cold water bodies, both east and west of the Continental Divide. It occurs in streams, large rivers, and lakes but seems to prefer large rivers. Trout and various coldwater sculpins, suckers, and minnows are their principal associates (McAfee 1966). In the Logan River, Utah the mountain whitefish prospers in waters with a mean temperature of 9° C to 11° C, a near saturation of oxygen, and a pH of 8.1 to 8.4 (Sigler and Sigler 1987). In the Logan River, they are found anywhere where pools are at least 5 m wide and 0.9 m to 1.2 m feet deep during base flow conditions.

The mountain whitefish is primarily a bottom feeder consuming a variety of organisms, especially aquatic insect larvae such as mayflies, stoneflies, caddisflies and midges, small molluscs, and occasionally fish (Scott and Crossman 1973). Mountain whitefish typically feed more actively in the cold winter months than in some of the warmer summer months (Sigler and Sigler 1987). Like most bottom feeding fish, the mountain whitefish opportunistically will

eat the eggs of its own species and other species (Foerster 1925; Simon 1946--from Scott and Crossman 1973). It is doubtful that predation by whitefish on the eggs of other salmonids is harmful to these species (Scott and Crossman 1973).

Spawning by mountain whitefish occurs in late fall through early winter (mid to late November or early December) but this depends on latitude and temperature (Sigler and Sigler 1987). Whitefish in streams and rivers move from pool areas to riffles to spawn; those present in lakes typically move into tributary streams. Whitefish do not build redds. In northern Idaho, they spawn during late October and early November when water temperatures range between 4° C and 7° C. Spawning occurs over gravel or gravel and rubble in streams and rivers where there is adequate current to remove silt from the eggs (Scott and Crossman 1973; Sigler and Sigler 1987). They have also been known to spawn in shallow water along the gravel shores of lakes. The eggs are adhesive and stick to the stream bottom substrate. Eggs require low temperatures for optimum development, generally 6° C or less (Rajagopal 1979). The growth of larval and juvenile mountain whitefish has been found to be greater at 9° C and 12° C , than at 6° C (Stalnaker and Gresswell 1974)--from Rajagopal 1979. Whitefish eggs will typically hatch in March. Newly hatched fry are generally found in stream shallows for a few weeks but then move offshore. Sexual maturity is typically reached at age 3 or 4.

Mountain whitefish are an important game fish in Idaho including locally in the Boise area. During a March 1994 to February 1995 creel survey conducted on the Boise River from Eckert Road downstream to Glenwood Bridge, anglers caught an estimated 10,000 whitefish (Allen et al., in press). This represented nearly 20% of the total catch.

Boise River Drainage

Mainstem Boise River Water Quality Limited Segments

Question 1) Based on the most current information collected by the U.S. Geological Survey (USGS) and IDFG (December 1996), cold water biota are documented to exist in all four mainstem water quality limited segments (WQLS) albeit seasonally for the lower two segments.

Wild rainbow trout (*Oncorhynchus mykiss*) and naturalized brown trout (*Salmo trutta*) were present in the following sections: Lucky Peak Dam to Veteran's Park and Veteran's Park to Caldwell. These two species were not collected in the two most downstream WQLS's (Caldwell to Notus; Notus to Snake River). Mountain whitefish

were the most prevalent salmonid species found in all four WQLS's of the mainstem Boise River. As a percent of total numbers of fish collected, they ranged from 9% to 39% of samples. Sculpin (*Cottus* spp.), also cold water biota, were collected from the upper two WQLS's but were absent in the two lower segments. Sculpin exhibited a dramatic decline in abundance between the upper two sampling locations.

While salmonids are known to be year-around residents in the upper two mainstem WQLS's, it appears questionable at this time whether or not trout species are found in the lower two WQLS's. Whitefish distribution is year-around in the upper two WQLS's with apparent seasonal distribution (fall-winter) in the lower two reaches due to environmental influences. Sculpin distribution seems to mirror that of trout species. Gibson (1975) found rainbow trout and brown trout year-around in the upper two reaches, but not below the Eagle to Star area during any of his three sampling periods (winter, summer, fall). Mountain whitefish were the predominant coldwater game fish collected in the 1974 survey again displaying seasonal distribution patterns. They were found year-around in the upper two WQLS's and during the fall-winter period in the lower two segments (Gibson 1975; Will Reid, IDFG, personal communication). Gibson (1975) reported collecting sculpin only in the Boise area.

Earlier fish population assessments performed on the mainstem Boise River by Webb and Casey (1961) in February 1960 from Lucky Peak Dam to Parma showed mostly similar trends in species presence/absence, distribution, and abundance. They documented the presence of rainbow trout and whitefish as far downstream as Middleton. However, of note was the general lack of trout species and low numbers of whitefish documented in the upper Boise River above the Eagle Fish Hatchery. Webb and Casey (1961) noted the presence of sculpin in the Boise River in sampling stations located five miles below Lucky Peak Dam (approximately 3/4 miles below Barber Bridge), and 13 miles below the dam directly above the old Strawberry Glen Bridge. Sculpin were not collected at sites located ten miles below Lucky Peak Dam (immediately below Lander Street sewage treatment facility) or at sampling stations near Eagle Island and Middleton. Since trout and whitefish were present at these latter locations, we would also expect sculpin. Their absence could have been the result of sampling inefficiency.

Since 1986, the IDFG has either sponsored or performed semi-annual fish population surveys in the mainstem Boise River from Diversion Dam downstream as far as Eagle Island (Ashbridge and Bjornn 1988; Mabbott and Holubetz 1990; Allen et al., *in press*; Allen et al., *in press*). Cold water biota, including trout species, whitefish, and

sculpin species, were sporadically found in this river reach in late fall-winter sampling. Salmonid and sculpin abundance and population structure varied depending on environmental factors.

Past creel surveys conducted by the IDFG in the Boise River have documented in angler harvest the presence of wild and natural rainbow trout, brown trout, and mountain whitefish (Reid and Mabbott 1987; Allen et al., *in press*).

Based on past sampling efforts, cold water biota were present in the upper two WQLS's year-around before November 28, 1975 and during the fall-winter period in the lower two WQLS's. Post-1975 sampling efforts have documented similar trends in cold water species distributions.

Question 2) Based on past and recent electrofishing efforts and creel surveys done by the IDFG and others, we know that natural reproduction occurs by wild-natural stocks of rainbow trout, natural brown trout, and mountain whitefish due to the collection and documentation of younger age classes (ages 0-2) of these species. Length-frequency distribution graphs, fish scale analysis, and the separation of hatchery and wild/natural fish are frequently used tools to assist in the process of identifying natural reproduction.

The presence of fish redds (nests) is another obvious sign of natural reproduction, but to the best of our knowledge, redds have not been documented in the mainstem Boise River WQLS's by fishery workers or others. A single brown trout redd was observed in the fall of 1990 in Loggers Creek at Schmeizer Lane by IDFG employees (Scott Grunder, IDFG, personal communication). As previously mentioned, mountain whitefish do not construct redds but spawn over gravel or gravel and rubble. It is apparent, however, that natural reproduction of trout and whitefish is occurring in the system at least in the upper two WQLS's. Otherwise, without suitable annual recruitment of new individuals into populations, they would eventually be extirpated. Natural reproduction by trout species in the upper two segments appears to be limited due to their relatively low abundance and sporadic distribution. It is unlikely that trout spawn in the lower two WQLS's.

Juvenile whitefish were found at three of four sampling locations in 1996 (Glenwood Bridge, Middleton, Parma). They were also documented at Eagle Island in the south channel. It is likely that the presence of juvenile whitefish at these locations indicates successful natural reproduction at the three lower WQLS's. Based on previous IDFG investigations, whitefish also undoubtedly spawn in the uppermost segment.

Question 3) Warm water game fish such as largemouth bass (*Micropterus salmoides*) and bluegill (*Lepomis macrochirus*), have infrequently been encountered in sampling efforts over the years in the upper two WQLS's. It is likely that bass, bluegill, and other warm water game fish present upstream of the Star-Eagle reach probably originate from numerous ponds or gravel pits fronting the Boise River. Gibson (1973) collected the greatest number of warm water game fish in the summer downstream of Star and Caldwell. Since the USGS sampled the Boise River in December 1996, it was expected that few if any warm water game fish would be collected. However, we know that cool-warm water game fish are popular with anglers below Caldwell including smallmouth bass, largemouth bass, bluegill, channel catfish, and bullheads. They are typically associated with sloughs or backwaters.

Native cyprinids (minnows) and catostomids (suckers) in the Boise River system are typically eurythermal species. In other words, they have a wide tolerance range between upper and lower avoidance temperatures. Two possible exceptions are longnose dace (*Rhinichthys cataractae*) and mountain sucker (*Catostomus platyrhynchus*). Longnose dace are generally found in swift waters such as turbulent mountain streams and has a preferred temperature range of 12° C to 21° C suggesting it is more cold water oriented (Sigler and Miller 1963; Trautman 1981). Mountain sucker prefer summer water temperature between 12° C and 21° C and suffers when water temperatures reach above 24° C (Sigler and Sigler 1987).

Eurythermic species such as largescale sucker (*Catostomus macrocheilus*), redside shiner (*Richardsonius balteatus*), northern squawfish (*Ptychocheilus oregonensis*), Umatilla dace (*Rhinichthys osculus umatilla*), and chiselmouth (*Acrocheilus alutaceus*) are present throughout the Boise River, but are most abundant in summer downstream of Boise due to higher ambient water temperatures and more desirable habitat conditions. These species are probably more appropriately categorized as warm water biota rather than cold water biota as done in the 1996 Water Body Assessment Guidance document (Idaho DEQ 1996). These species are also more pollution tolerant than obligate cold water fish species (stenotherms) such as trout. Introduced centrarchids (sunfish) and ictalurids (catfish) are typically stenothermic, preferring warmer temperatures, and are most abundant in the lower Boise River system.

Question 4)

Lucky Peak Dam to Veteran's Park: As evidenced from both historical and recent fish population sampling efforts, cold water biota including trout, whitefish, and sculpin are present year-

around in this reach of the Boise River. However, they are sporadically distributed in limited numbers. Mountain whitefish appear more resilient than trout but are unquestionably subject to extreme population fluctuations due to environmental conditions. Sculpin are locally abundant but generally disappear below the Lander Street sewage treatment facility. We consider cold water biota and salmonid spawning beneficial uses to be impaired in this WQLS. We do not consider warm water biota to be a viable existing use in this segment because obligate warm water species are not found in appreciable numbers until below Middleton.

Veteran's Park to Caldwell: Cold water biota are found throughout most of this WQLS from Veteran's Park downstream to Middleton, but are most abundant from Eagle Island upstream. They do not appear to be present below Middleton. Again, even where cold water biota are present in any numbers, they are sparsely distributed. Mountain whitefish are most abundant in the Middleton-Caldwell reach in the fall-winter period. Sculpin decline dramatically below Glenwood Street. We consider both cold water biota and salmonid spawning beneficial uses impaired in this WQLS. Warm water biota as represented by game fish species such as sunfish and catfish do not appear in appreciable numbers until below the Middleton-Caldwell area. However, below Star it is probably appropriate to consider warm water biota as an existing beneficial use based on findings of Webb and Casey (1961) and Gibson (1975). The IDFG does not consider a warm water biota designated use entirely appropriate for the Boise River until below Caldwell since environmental and habitat conditions are not optimal until below that point.

Caldwell to Notus: By all accounts, mountain whitefish are the sole cold water fish species present in this WQLS and appear to only inhabit this reach in the fall-winter period. Up until a decade ago, Indian Creek (which drains into the Boise River at Caldwell) supported a healthy native rainbow (redband) trout population which was essentially extirpated by an unfortunate accident at Armour's in the late 1980's and has not recovered. It is probable that Indian Creek trout may have recruited to the lower Boise River system. Based on the more comprehensive findings of Gibson (1975) coupled with the 1996 data, it appears the cold water biota beneficial use is impaired as evidenced by only seasonal distribution and lack of trout species present. We cannot confirm or deny the presence of trout spawning activity but it is unlikely.

At this time, the IDFG cannot make a current status call on the health of the warmwater fish community in this river segment since recent sampling was done in the winter. While the nongame component was well represented by carp (*Cyprinus carpio*), chiselmouth, Umatilla dace, and largescale sucker, game fish

species were almost nonexistent since they were in wintering habitats and were difficult to sample. Gibson (1975) found the greatest summer numbers of warm water game fish in the reach below Star.

Notus to Snake River: Mountain whitefish were the only obligate cold water species collected in winter 1996 sampling from this lower-most WQLS. Fewer nongame fish were collected. Based on the rather limited sampling done in the winter of 1996, it is tenuous at best to make a status call on warm water biota. However, for cold water biota, taking into account the recent findings and that of Gibson (1975), it appears that obligate cold water fish use the lower-most river only in the fall-winter period. Additionally, trout species are not present, trout spawning is unlikely based on current conditions, and spawning by whitefish cannot be discounted.

Question 5)

Lucky Peak Dam to Veteran's Park: In our estimation, the causes of impairment for cold water biota in this river segment include altered flow regime, lack of stream bank cover, lack of instream cover (pool depth, woody debris, substrate interstices, etc.), sediment, toxics avoidance (e.g. chlorine), channelization, limited gravel recruitment, and food production. Summer temperatures may be a problem because of the lack of good instream habitat conditions for fish to escape to more suitable locations. Coupled with these limiting factors is high fishing pressure which could effect already suppressed wild fish numbers. However, in this situation, high angling mortality of wild-natural trout may be a function of the cumulatively poor habitat conditions leading to increased vulnerability. The general lack of sufficient habitat renders the remaining wild fish more susceptible to overharvest. A scenario of closing the river to harvest would probably elicit little positive response in wild fish populations due to relatively poor habitat conditions.

Salmonid spawning is impaired by the general lack of suitable particle sizes (gravel of 1-3 inches in diameter), fine sediment, armoring of substrate, lack of sufficient numbers of wild/natural spawning fish, altered flow regime, and lack of suitable escape cover for spawning fish.

Asbridge and Bjornn (1988) cited limiting factors for trout in the Boise River from Barber Dam to Star as summer water velocities, above optimal summer temperature, lack of winter cover, lack of cover, sediment, lack of spawning habitat, and angler harvest.

Veteran's Park to Caldwell: The same factors as above impair cold water biota in this river segment. Other significant limiting

factors may be flood control practices (snagging and clearing of vegetation, gravel bar removal), regulated gravel mining, numerous unscreened irrigation diversions, fish passage barriers, low flows during irrigation season below Star, and chemical avoidance/toxicity (e.g. chlorine, agricultural chemicals). Below Glenwood Bridge, fishing pressure is much reduced, however, we still observe little recovery in cold water fish species. Temperature limitations may be more pronounced below Star. Below Garden City, there is the transition from urban to rural. This is a highly manipulated river channel.

Salmonid spawning is limited by the same factors as above. For a further discussion on suspected limiting factors, please refer to Asbridge and Bjornn (1988).

Caldwell to Notus/Notus to Snake River: In these two lowest WQLS's, both cold water biota and salmonid spawning are impaired by the same problems as above, however, higher water temperatures, sediment, and chemicals may be larger problems. Water quality concerns are more pronounced in these two segments due to the cumulative effects of intensive agricultural practices.

Although not a designated use for these river segments, warm water biota are the dominant group of fish present. While we do not have enough information to make a status call on warm water biota, we suspect agricultural chemicals and sediment may effect warm water game fish distribution as well.

Many agricultural chemicals, pesticides and herbicides in particular, can have adverse impacts on aquatic organisms (Whitford et al. 1994; State of California 1963). Commonly used herbicides in southwestern Idaho include acrolein and 2,4-D, both of which can be toxic to aquatic organisms (State of California 1963; Eisler 1994). Acrolein kills fish and other aquatic life at recommended treatment concentrations (Bowmer and Smith 1984--from Eisler). In treated irrigation canals, acrolein probably eliminates or seriously depletes all populations of aquatic fauna (Eisler 1994). Acrolein has been used since 1960 to control submerged aquatic weeds in irrigation systems in the United States and elsewhere (Hill 1960; Bartley and Hattrup 1975; Bowmer and Higgins 1976; Reinert and Rodgers 1987). In water, while the half-time persistence is usually less than 50 hours, this is sufficient time to suspect that applications of this substance routinely reach natural surface waters. Frequent applications of acrolein during the growing season could cause chronic suppression or elimination of aquatic fauna. In one Montana stream, acrolein killed all fish in a 4 km reach after application to control aquatic plants and some fish were reported dead as far downstream as 6.4 km (Fritz-

Sheridan 1982). This is just one commonly used compound. There are numerous other chemicals used by the agricultural industry and other interests in southern Idaho which pose hazards to fish and other aquatic life

Question 6) We have little numeric criteria to recommend as a means to resolve impairment issues in WQLS's of the Boise River. However, physical habitat conditions must improve measurably before any resulting change will be observed in cold- and warm-water game fish populations. Due to increasing urbanization of the upper drainage, significant changes in habitat quality may be difficult to achieve. In our opinion, continued urban development of the river floodplain will continue unabated. Unfortunately, the more it is developed, the greater the perceived need to control the river through flood control practices, snagging and clearing, channelization, constructing levies, removing vegetation, etc. These practices have long been destructive to fish and wildlife habitats.

In order to improve conditions for aquatic biota in the Boise River, we offer the following ideas and recommendations. appropriate.

1) Do not remove accumulations of large woody debris in the river channel adjacent streambanks unless it poses a real threat to property, structures, or human safety. The lack of large cover elements in the channel inhibits the production of trout.

2) Regulated gravel mining should be prohibited in the river channel below the ordinary high water mark. Gravel recruitment is already minimal because of upstream reservoirs. Suitable gravel is important for spawning fish and insect production.

3) The sources of human-caused sediment must be identified, captured, and reduced in order to measurably improve the aquatic environment of the lower Boise system. Optimal habitat and reproductive conditions for aquatic macroinvertebrates, trout, whitefish, and other aquatic biota are maintained when surface fine sediment levels are minimal. Waters (1995) provides comprehensive discussions on suspended and bedload fine sediment effects on stream dwelling aquatic biota. There is an extensive volume of literature available on sediment effects on salmonid habitat, salmonid spawning, invertebrate habitat, and behavior, etc. While numeric criteria is available in the literature describing threshold fine sediment levels in pools, egg pockets, interstitial spaces, or the water column, it should be use with caution. Please refer to Waters (1995) for this overview.

Suspended sediment produces little or no direct mortality on adult fish at levels observed in natural, relatively unpolluted streams (Waters 1995). Most early papers were very speculative reporting only visual observations of muddy conditions associated with fish kills, or the result of extreme conditions produced in laboratory tests (Cordone and Kelley 1961). According to Waters (1995), the determination of precise concentrations of suspended sediment that cause acute mortality is difficult and results vary. In a review by Lloyd (1987), discussion focused on sublethal effects of suspended sediment including avoidance and distribution, reduced feeding and growth, respiratory impairment, reduced tolerance to disease and toxicants, and physiological stress. Experiments of sublethal effects tended to be more objective and quantified in nature. This type of literature is much more abundant regarding cold water versus warm water fishes.

In the watershed paper by Cordone and Kelley (1961), they reviewed the effects of sediment on all components of the biological community in streams, including salmonid reproduction. They especially emphasized the importance of fine sediment in salmonid redds and its injurious effect. Their general conclusions were (1) eggs and sac fry are killed as a result of the smothering by suspended sediments entering the redd; (2) sediments obstruct the flow of water and its oxygen supply through the redd, causing asphyxiation; (3) continuous applications of small quantities of sediment into the redd are more detrimental than short-term, sudden flushes; and (4) sediment is one of the most important environmental factors that influence the success of salmonid spawning.

It is well accepted there is an inverse relationship between salmonid egg survival and percentage of fine sediment in spawning gravels. A level of 20% fines less than 0.8 mm became well established and was accepted by many investigators as the criterion above which significant mortality of embryos could be expected (Reiser and White 1988; many others as well). However, other research focused on sediment in the egg pocket and resulted in improved measures over particle-size percentage such as measures of central tendency particularly the geometric mean diameter of substrate particles (Platts et al. 1979) and the fredle index (Lotspeich and Everest 1981; Beschta 1982). The effect of sediment upon reproductive success of warmwater fishes is not well known (Waters 1995). The major publication on this topic including early life of warmwater fishes is by Muncy et al. (1979).

Fine sediment also impacts sac fry emergence from the gravels, the physical habitat of various life stages of fish, and aquatic insect production. According to Waters (1995), the two most important effects of deposited sediment upon the physical habitat of fish are

(1) filling of interstitial spaces of riffles, which reduces or eliminates those spaces essential to fry, especially in winter when fry retreat to coarse riffle bottoms for overwinter cover; and (2) reductions of water depth in pools, including the complete loss of pools and cover with heaviest sedimentation, which decrease physical carrying capacity for juvenile and adult fish during summer growth periods.

4) Minimum flows in the Boise River during the winter (nonirrigation season) should not decrease below 240 cubic feet per second.

5) Water quality standards for certain chemical constituents such as free chlorine need reexamination. Sedentary, bottom-dwelling cold water fishes like sculpin appear to be avoiding sites immediately below both of Boise's water treatment facilities. We do not believe it is related to differences or changes in stream bottom habitats. The literature suggests that trout are also very intolerant of free chlorine (State of California 1963). However, trout are very mobile species and could easily avoid unsuitable conditions unlike less mobile fish like sculpin.

6) There needs to be strong state, federal, and local education programs informing the public and others about the hazards of commonly used herbicides and pesticides to the environment.

Question 7) We are submitting an excerpt from our 1996-2000 Fisheries Management Plan describing our programs and objectives for the Boise River Drainage. Current fishing regulations for the Boise River are the entire mainstem is open to fishing year-around from its mouth upstream to Arrowrock Dam. General regulations apply (6 trout bag & possession limit, no gear restrictions, no size limits) for the entire river except a limited quality trout zone between the United Water Corporation water treatment facility and the Loggers Creek diversion (2 trout bag & possession limits, no trout under 14 inches may be harvested).

Question 8) We believe some of the additional information needs for the Boise River system are as follows.

1) A general, but comprehensive fish population assessment needs to be done on the Boise River mainstem on a four-season basis from Lucky Peak Dam to the mouth. This would provide a more complete picture of species composition and distribution. This type of

survey has not been done since 1974. Recent surveys have been relegated to winter low flow conditions giving a cursory and incomplete picture.

2) Fish populations need to be assessed in tributaries to the mainstem Boise River.

3) Comprehensive riparian and instream physical habitat studies should to be done to assess current and potential conditions for aquatic biota, and to explore realistic opportunities for rehabilitation.

4) The IDFG requests written examples of other state's beneficial use status assessments and how they have dealt with issues such as limited cold water biota criteria, salmonid spawning, nongame species, T & E species, etc.

5) We should identify the sources of sediment to the Boise River below Lucky Peak Dam through Boise-Garden City and Eagle and develop potential containment/abatement measures.

Boise River Tributaries

Unfortunately, there is a paucity of information available on fish species and populations in lower Boise River tributaries. We have nothing of recent vintage to share with you. Most information was collected by the former Department of Health or the DEQ in coordination with the IDFG.

Based on file information from electrofishing samples and fish kill assessments, we know wild rainbow trout were present prior to November 28, 1975 in Indian Creek above and below Sugar Avenue, Seven Mile Creek, Fivemile Creek at Meridian, Tenmile Creek below confluence with Fivemile Creek, and Conway Gulch at Notus (Gibson 1975; unpublished IDFG file information). Wild rainbow trout were collected post-1975 in Sand Hollow Creek (Clark and Bauer 1983). The IDFG estimated upwards of 1,100 wild rainbow trout were killed in Indian Creek below Kings Corner in Nampa on and/or after January 31, 1986 following an accidental discharge of waste from Armour Fresh Meats Company (unpublished IDFG file information). As far as we are aware, it has not recovered. We have no information on Blacks Creek.

It appears likely that designated/potential uses are impaired in Indian Creek (Sugar Avenue to Boise River), Mason Creek (headwaters to New York Canal), Fivemile Creek (headwaters to Boise River), Tenmile Creek (headwaters to Fifteenmile Creek), and Sand Hollow Creek (headwaters to Snake River). The status of salmonid spawning and cold water biota in Indian Creek (headwaters to Sugar Avenue)

is unknown at this time. The status of aquatic biota is unknown in Blacks Creek at this time.

In our opinion, impairment of aquatic biota in these systems collectively is caused by historic spills, severe habitat degradation affecting in stream and riparian functions, excess sediment, channelization, irrigation return, pesticides and herbicides, etc.

We do not have detailed management goals for fish or wildlife in most of these tributaries because they are so degraded. Indian Creek has great potential to support wild rainbow trout throughout its length if habitat and water quality issues could be dealt with effectively. Improving the quality of tributary habitat and water quality may not be cheap, but it could be of enormous benefit to wild salmonids by opening up miles of spawning and rearing environments. Restoring stream and riparian environments would be of great benefit to wildlife as well.

Lake Lowell

Lake Lowell was once a premier warm water fisheries in southwestern Idaho, but a number of events since 1990 caused a total collapse of game fish populations. The most critical factors were the prolonged drought, summer evacuation of water from the lake for irrigation and low winter carryover of water; a major rebuild of dams for safety reasons in 1990-1991 with necessary drawdowns; and potential serious water quality problems (Grunder et al. 1993; IDFG file information). The IDFG sampled fish populations in summer 1994 and found that once abundant largemouth and smallmouth bass, crappie, bluegill, and bullhead were at extremely suppressed population levels (Allen et al., *in press*). Sampling performed by IDFG staff in summer 1996 indicates a modest but positive upward direction in population recruitment for game fish species (Allen et al., *in press*). We appear to be observing several year classes of bass species with strong 0+ and 1+ cohorts.

Currently, Lake Lowell is supporting warm water biota and natural reproduction of game fish species, however, game fish populations have not come close to recovering to pre-1990 levels. This designated use should be considered impaired. Impairment may be a result of cumulative effects of drought and lake drawdowns, poor spawning conditions, poor overwintering conditions, lack of security cover, excessive nutrients (eutrophication), pesticides and pesticides, and other unknown factors.

Fish and Game's goals for the fishery of Lake Lowell can be found in the attached excerpt from our 1996-2000 Fisheries Management Plan for the Boise River Drainage.

In our opinion, water quality should be monitored annually in the Lake Lowell watershed. The fishery will be monitored every two years or as needed.

In closing, the IDFG wishes to emphasize the economic and intrinsic values of these water bodies to local communities and the state. As previously mentioned for the Boise River, the last creel survey conducted by the IDFG in 1994-1995 documented an estimated 70,000 hours of fishing effort in the reach from Eckert Road downstream to Glenwood Bridge (Allen et al., in press). We conservatively estimate the value of this cold water fishery at about $220,000 annually on a 12-hour Recreation Visitor Day (RVD) basis (Sorg et al. 1985). This does not include the fishery value below Glenwood Bridge since angler use is undocumented. The river corridor below Star also receives significant use by waterfowl and upland game hunters.

At its peak in the 1980's, the Lake Lowell fishery supported in excess of 100,000 angler hours. At its nadir in the early 1990's, fishing pressure declined to about 20,000 hours. We conservatively estimate the potential annual value of this warm water fishery at about $276,000 on a 12-hour RVD basis. Based on this value estimate, the collapse of the warm water fishery at Lake Lowell has meant a significant monetary loss to the local and state economy. Waterfowl and upland game hunting are also very significant recreation activities at Lake Lowell.

Both of these water bodies are renowned for their abundant wildlife resources including waterfowl, songbirds, wintering bald eagles, shorebirds, and furbearers. Wildlife viewing is an important and growing recreational opportunity at both areas which contributes significantly to the economy.

Thank you for the opportunity to comment. Questions should be directed to Scott Grunder, Natural Resources Biologist.

Sincerely,

Tracey Trent
Regional Supervisor

TT:sag

(w/attachments)

cc: NRPB (Cal Groen)
Southwest Region (Yundt, Nelson)

LITERATURE CITED

Allen, D.B., S.P. Yundt, and B.J. Flatter. In press. Federal Aid in Fish Restoration. Job Performance Report. Project F-71-R-21. Regional Fisheries Management Investigations. Idaho Department of Fish and Game. Boise, Idaho.

Allen, D.B., S.P. Yundt, and B.J. Flatter. In press. Federal Aid in Fish Restoration. Job Performance Report. Project F-71-R-20. Regional Fisheries Management Investigations. Idaho Department of Fish and Game. Boise, Idaho.

Allen, D.B., S.P. Yundt, and B.J. Flatter. In press. Federal Aid in Fish Restoration. Job Performance Report. Project F-71-R-19. Regional Fisheries Management Investigations. Idaho Department of Fish and Game. Boise, Idaho.

Asbridge, G. and T.C. Bjornn. 1988. Survey of potential and available salmonid habitat in the Boise River. Federal Aid in Fish Restoration. Job Completion Report. Project F-71-R-12. Prepared for the Idaho Department of Fish and Game. Idaho Cooperative Fish and Wildlife Research Unit, University of Idaho, Moscow Idaho.

Bartley, T.R. and A.R. Hattrup. 1975. Acrolein residues in irrigation water and effects on rainbow trout. U.S. Department of the Interior, Denver Engineering and Research Center, Bureau of Reclamation Report REC-ECR--75-8.

Beschta, R.L. 1982. Comment on "Stream system evaluation with emphasis on spawning habitat for salmonids" by M.A. Shirazi and W.K. Seim. Water Resources Research 18:1292-1295.

Bowmer, K.H. and M.L. Higgins. 1976. Some aspects of the persistence and fate of acrolein herbicide in water. Archives of Environmental Contamination and Toxicology 5: 87-96.

Bowmer, K.H. and G.H. Smith. 1984. Herbicides for injection into flowing water: acrolein and endothalamine. Weed Research 24: 201-211.

Clark, W.H. and S.B. Bauer. 1983. Water Quality Status Report. Lower Boise River Drains, Canyon County, Idaho. Water Quality Series No. 50. Idaho Department of Health and Welfare, Division of Environmental Quality, Boise, Idaho.

Cordone, A.J. and D.W. Kelley. 1961. The influences of inorganic sediment on the aquatic life of streams. California Fish and Game 47: 189-228.

Eisler, R. 1994. Acrolein hazards to fish, wildlife, and invertebrates: a synoptic review. Biological Report 23, Contaminant Hazard Reviews, Report 28. U.S. Department of the Interior, National Biological Survey, Washington, D.C.

Foerster, R.E. 1968. Studies in the ecology of the sockeye salmon (Oncorhynchus nerka). Contrib. Can. Biol. n.s. 2(16): 335-422.

Fritz-Sheridan, R.P. 1980. Impact of the herbicide Magnacide-H (2-propenol) on algae. Bulletin of Environmental Contamination and Toxicology 28: 245-249.

Gibson, H.R. 1975. Snake River Fisheries Investigations. Job Performance Report. Project F-63-R-4. Idaho Department of Fish and Game. Boise, Idaho.

Grunder, S.A., D. Parrish, and T. Holubetz. 1993. Federal Aid in Fish Restoration. Job Performance Report. Project F-71-R-15. Regional Fisheries Management Investigations. Idaho Department of Fish and Game, Boise, Idaho.

Hill, R.D. 1960. The use of acrolein; acrylaldehyde; 2-propenol in the treatment of submerged weeds in farm ponds. Ohio Agricultural Experiment Station.

Idaho Division of Environmental Quality. 1996. 1996 Water Body Assessment Guidance-a stream to standards process. Idaho Department of Health and Welfare, Division of Environmental Quality, Boise, Idaho.

Lloyd, D.S. 1987. Turbidity as a water quality standard for salmonid habitats in Alaska. North American Journal of Fisheries Management 7:34-45.

Lotspeich, F.B. and F.H. Everest. 1981. A new method for reporting and interpreting textural composition of spawning gravel. U.S. Forest Service Research Note PNW-369.

Mabbott, B. and T. Holubetz. 1990. Federal Aid in Fish Restoration. Job Performance Report. Project F-71-R-13. Regional Fisheries Management Investigations. Idaho Department of Fish and Game. Boise, Idaho.

McAfee, W.R. 1966. Mountain whitefish. From: Inland Fisheries Management, A. Calhoun (ed.). State of California. The Resources Agency. Department of Fish and Game.

Muncy, R.J., G.J. Atchison, R.V. Bulkley, B.W. Menzel, L.G. Perry, and R.C. Summerfelt. 1979. Effects of suspended solids and sediment on reproduction and early life of warmwater fishers: a review. U.S. Environmental Protection Agency, EPA Report

600/3-79-042, Washington, D.C.

Platts, W.S., M.A. Shirazi, and D.H. Lewis. 1979. Sediment particle sizes used by salmon for spawning, with methods for evaluation. U.S. Environmental Protection Agency, EPA Report 600/3-79-043, Washington, D.C.

Rajagopal, P.K. 1979. The embryonic development and the thermal effects on the development of the mountain whitefish, Prosopium williamsoni (Girard). Journal of Fish Biology 15: 153-158.

Reid, W. and B. Mabbott. 1987. Federal Aid in Fish Restoration. Job Performance Report. Project F-71-R-11. Regional Fisheries Management Investigations. Idaho Department of Fish and Game. Boise, Idaho.

Reinert, K.H. and J.H. Rodgers. 1987. Fate and persistence of aquatic herbicides. Reviews of Environmental Contamination and Toxicology 98: 61-98.

Reiser, D.W. and R.G. White. 1988. Effects of two sediment size-classes on survival of steelhead and chinook salmon eggs. North American Journal of Fisheries Management 8: 432-437.

Scott, W.B. and E.J. Crossman. 1973. Freshwater fishes of Canada. Bulletin 184. Fisheries Research Board of Canada. Ottawa, Canada.

Sigler, W.F. and J.W. Sigler. 1987. Fishes of the Great Basin-a natural history. University of Nevada Press. Reno, Nevada.

Sigler, W.F. and R.R. Miller. 1963. Fishes of Utah. Utah Department of Fish and Game. Salt Lake City, Utah.

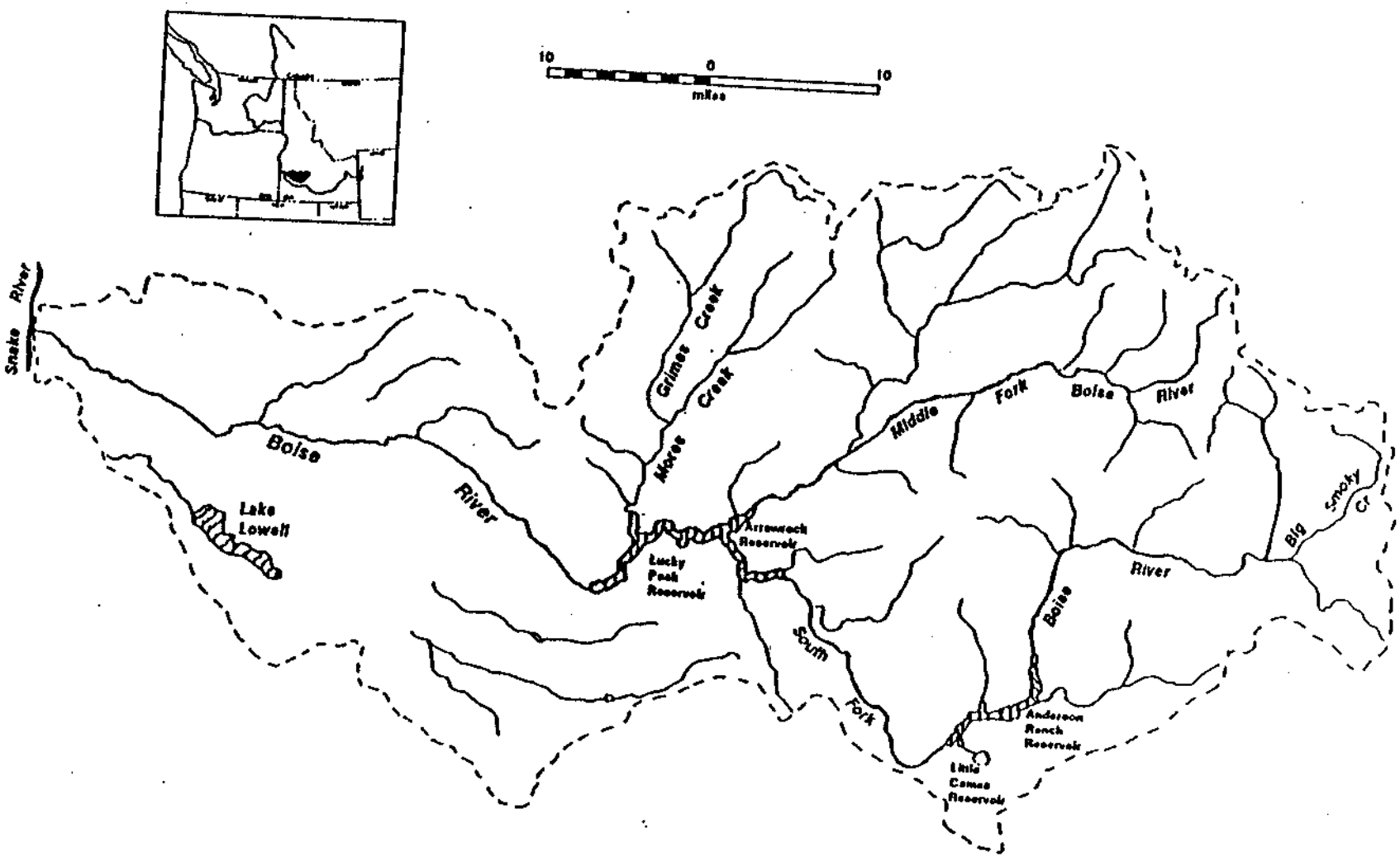
Simon, J.R. 1946. Wyoming fishes. Wyoming Game and Fish Department Bulletin 4.

Sorg, C.F., J.B. Loomis, D.M. Donnelly, G.L. Peterson, and L.J. Nelson. 1985. Net economic value of cold and warm water fishing in Idaho. Resource Bulletin RM-11. USDA-Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado.

Stalnaker, C.B. and R.E. Gresswell. 1974. Early life history and feeding of young mountain whitefish. U.S. Environmental Protection Agency, Ecological Research Series, EPA-660/3-73-010. Washington, D.C.

State of California. 1963. Water Quality Criteria. 2nd Edition. J.E. McKee and H.W. Wolf (eds.). Publication No. 3-A. The Resources Agency of California, State Water Quality Control

Boise River Drainage



A. Overview

The Boise River basin lies in southwestern Idaho and contains about 4,100 square miles of land. The headwaters of the Boise River originate in the Sawtooth Mountains at elevations in excess of 10,000 feet. It flows in a westerly direction for about 200 miles before emptying into the Snake River near Parma at an elevation of 2,100 feet. Major tributaries to the Boise River include the North Fork Boise River (382 square miles), the South Fork Boise River (1,314 square miles) and Mores Creek (426 square miles). This basin has an average annual runoff of 2,005,000 acre-feet of water.

The Boise River has three major instream impoundments, Anderson Ranch, Arrowrock and Lucky Peak reservoirs, and one large off-stream impoundment, Lake Lowell. The four large reservoirs have a combined storage capacity of 1,143,249 acre-feet of water. The Boise River reservoirs supply water storage for irrigation flood control, recreation, hydropower, and instream flows.

Because of the wide range in elevations, geographic features, and water uses, the Boise River has a great variety of habitat types and fish species. The drainage includes the major population center in the state, has over 250,000 acres of irrigated cropland, and some of Idaho's earliest mining, logging, and hydroelectric developments. Man-caused impacts have severely degraded most habitats over a long period of time creating severe limitation on fishery productivities.

From the mouth of the Boise River upstream to Star, low summer flows and poor water quality limit fishery production. This section of river supports a fair fishery for largemouth bass, smallmouth bass, and channel catfish. From Star upstream to Lucky Peak Dam, the river changes from a warmwater to a coldwater fishery. Mountain whitefish make up the bulk of the game fish biomass, with hatchery-reared rainbow trout, wild rainbow trout, and fingerling brown trout plants supporting the bulk of the fishing pressure. Upstream from Lucky Peak and Arrowrock reservoirs, rivers and streams contain excellent populations of wild rainbow trout, mountain whitefish, and bull trout. Brook trout, redband trout, and cutthroat trout occur in some tributary streams. Due to the heavy angling pressure exerted on these streams, catchable-size hatchery rainbow trout supplement wild populations in selected heavy use areas.

In 1978, the South Fork Boise River between Arrowrock Reservoir and Anderson Ranch Dam was the first designated quality trout stream segment in southwestern Idaho. Wild rainbow trout and mountain whitefish make up the majority of the fish caught in the South Fork. The rainbow trout fishery there is managed with limit, size, and tackle restrictions. In 1978, anglers caught an estimated 19,150 rainbow trout and released 18,059 (94%). In 1988, anglers caught an estimated 18,400 rainbow trout and released 99%.

A 1988 creel survey of the South Fork Boise River between Featherville and Big Smokey Creek estimated effort at 228 hours/km. Hatchery rainbow trout made up over 80% of fish checked in anglers' creels, but the overall return total creel rate was only 21%, indicating hatchery fish need to be more efficiently utilized.

Popular reservoir fishing within the Boise River drainage exists at Lake Lowell, Lucky Peak, Arrowrock, Anderson Ranch, and Little Camas reservoirs. The Lake Lowell fishery consists primarily of largemouth bass, smallmouth bass, yellow perch, black crappie, bullhead, bluegill, and channel catfish. Lucky Peak and Anderson Ranch reservoirs provide "two-story" fisheries with smallmouth bass occupying the warm, inshore waters and rainbow trout and kokanee dominating the cold, mid-water fishery. The rainbow trout fishery in these reservoirs depends heavily on stocked catchable or fingerling size fish. Little Camas and Arrowrock reservoirs also provide excellent fishing for rainbow trout stocked as catchables and/or fingerlings. Neither of these two reservoirs has a conservation pool, and both have a history of total water evacuation.

Good spawning conditions in tributary streams provide a continuous supply of kokanee in Anderson Ranch Reservoir, but maintenance stocking is required in Lucky Peak and Arrowrock reservoirs. At Anderson Ranch Reservoir, one of the more popular kokanee fisheries in southern Idaho, anglers harvested an estimated 40,000+ kokanee in 1979 and 34,000 in 1985. Kokanee populations in the reservoir have fluctuated significantly from 1983 through 1989 due to extreme high and low water conditions in the drainage. Ongoing studies of kokanee populations are being used to develop models to reduce population fluctuations through stocking in low number years. Fall chinook salmon will be considered to crop excess kokanee numbers and to provide a trophy fishery if kokanee numbers become excessive.

Alpine lakes within the Boise River drainage provide anglers with a variety of fishing opportunity. Rainbow, cutthroat, and brook trout are abundant with lesser numbers of golden trout. There are 224 alpine lakes in the Boise drainage. Most of these lakes are too small to support a fishery. The Department presently stocks 68 of the alpine lakes in the Boise River system.

B. Objectives and Programs

1. Objective: Provide a diversity of fishing opportunities within the Boise River drainage.

   Program: Zone the stream areas to concentrate hatchery catchable stocking in the locations where the highest return to the creel will occur.

   Program: Manage for wild trout where habitat and fish populations will sustain acceptable fisheries.

   Program: Manage for increased catch rates and fish size in selected stream reaches with quality and trophy trout regulations.

   Program: Stock appropriate strains of trout and other species to better utilize the rearing capacity and provide larger and more desirable fish to the angler.

   Program: Manage warmwater fisheries to provide a wide variety of sizes and species readily available to the large population of the Treasure Valley area.

   Program: Develop a pond in the Mores Creek drainage for planting catchable rainbows.

Program: Stock alpine lakes with a variety of species including rainbow trout, cutthroat trout, golden trout, and Arctic grayling to provide a variety of fishing experience. Impacts on native species will be considered prior to stocking new species.

2. Objective: Seek better land management practices that significantly improve fishery habitats.

Program: Provide sediment objectives/standards to land management agencies where sediment is the limiting factor in aquatic habitats.

Program: Provide riparian vegetation objectives to land management agencies where grazing, development, or other activities have degraded riparian zones.

Program: Seek to provide habitat necessary to preserve populations of native bull trout and redband trout.

3. Objective: Monitor effects of land management activities, fishery regulations, and other fishery management activities on fish habitat and fish populations.

Program: Collect common data base information on habitat and fish populations throughout the Boise River drainage.

Program: Examine changes and trends in common data base information and attempt to determine causes for any changes that are noted.

4. Objective: Seek improved reservoir management and stream flows.

Program: Pursue development of a minimum pool in Arrowrock Reservoir.

Program: Study water management at Lake Lowell to determine the relationship between fish production and water levels.

5. Objective: Maintain and improve bull trout populations.

Program: Maintain "no harvest" rule for bull trout on rivers and tributaries.

Program: Provide information to public on pressure, how to identify, and how to release bull trout.

Program: Evaluate bull trout populations in reservoirs to determine if a limited harvest opportunity exists.

Drainage: BOISE RIVER

Water	Miles/acre	Fishery			Management Direction
		Type	Species Present	Management	
Mouth to Star	34/	Mixed	Rainbow trout Mountain whitefish Largemouth bass Smallmouth bass Channel catfish Black crappie	General	Work with state and federal regulatory agencies to improve water quality and habitat condition. Evaluate fish population, species composition, and size structure. Determine angler satisfaction with current fishery.
Star to Barber Dam	25/	Coldwater	Rainbow trout Steelhead Brown trout Mountain whitefish	Put-and-take trout	Work with state and federal regulatory agencies to improve water quality and habitat condition. Stock with rainbow trout, brown trout, and steelhead seasonally. Stock catchable rainbow trout year-round. Manage for high density of anglers.
Barber Dam to Lucky Peak	4/	Coldwater	Rainbow trout Brown trout Mountain whitefish	General	Evaluate potential trophy trout management. Evaluate natural production potential.
Mores Creek		Coldwater	Rainbow trout Mountain whitefish	General	Work with regulatory agencies to enhance habitat. Stock with catchable rainbow trout.
Boise River Drains	92/	Coldwater	Rainbow trout Brown trout Mountain whitefish	General	Work with communities and regulatory agencies to improve water quality and habitat conditions. Improve angler access. Evaluate hatchery fingerling brown trout planting program.
Loggers Creek	2/	Coldwater	Rainbow trout Brown trout Mountain whitefish	General	Manage as a nursery stream to provide catchable size fish to Boise River.
Middle Fork Boise River from Arrowrock Reservoir to North Fork Boise River	11/	Coldwater	Rainbow trout Mountain whitefish Bull trout	Put-and-take trout Preservation	Stock with catchable rainbow trout following high water period until Labor Day. Evaluate return to the creel of hatchery trout. Monitor angler use and satisfaction with current fishery. Closed to harvest.
From North Fork to Atlanta Power Dam	32/	Coldwater	Rainbow trout Cutthroat trout Mountain whitefish Brook trout Bull trout	Quality Preservation	Manage for high catch rates on wild fish. Closed to harvest.
From Atlanta Power Dam to Sawtooth Wilderness Boundary	4/	Coldwater	Rainbow trout Cutthroat trout Mountain whitefish Brook trout Bull trout	Put-and-take trout Preservation	Stock with catchable rainbow following high water period until Labor Day. Evaluate return of hatchery trout. Develop catch-out pond for planting catchables to avoid competition with wild trout. Closed to harvest.

Upstream of Sawtooth Wilderness Boundary and all tributaries	30/	Coldwater	Rainbow trout Cutthroat trout Mountain whitefish Brook trout Bull trout	Wild trout Preservation	Manage for high catch rates and low angler densities. Manage for wild fish. Closed to harvest.
South Fork Boise River from Arrowrock Reservoir to Neal Bridge		Coldwater	Rainbow trout Mountain whitefish Bull trout	General Preservation	Manage for harvest opportunity for stream trout and mountain whitefish. Closed to harvest.
South Fork Boise River from Arrowrock Reservoir to Danskin Bridge	18/	Coldwater	Rainbow trout Mountain whitefish Bull trout	Trophy Preservation	Work with USFS to preserve low density angling experience. Manage for high catch rates for large fish. Closed to harvest.
South Fork Boise River from Danskin to Anderson Ranch Dam	10/	Coldwater	Rainbow trout Mountain whitefish Bull trout	Trophy Preservation	Manage for high catch rates for large fish. Closed to harvest.
South Fork Boise River from Anderson Ranch Reservoir to Pine Bridge	0.6/	Coldwater	Fall chinook salmon Rainbow trout Kokanee salmon Mountain whitefish Bull trout	General Preservation	Annual river closure to protect spawning kokanee to trap site. Monitor fall chinook salmon runs, if restocked, target fish for harvest. Closed to harvest.
South Fork Boise River from Pine Bridge to Beaver Creek	25/	Coldwater	Rainbow trout Mountain whitefish Kokanee salmon Bull trout	Put-and-take trout General Preservation	Good quality habitat with wild trout potential. High accessibility and campgrounds give potential for hatchery return rates of >30%. Consider use of regulation allowing harvest of adipose fin-clipped fish only. Closed to harvest.
South Fork Boise River from Beaver Creek to Big Smoky Creek	10/	Coldwater	Rainbow trout Mountain whitefish Kokanee salmon Bull trout	Quality Preservation	Good quality habitat for wild trout. Manage for quality >14-inch wild rainbow trout to increase natural reproduction. Closed to harvest.
South Fork Boise River from Big Smoky Creek to headwaters	15/	Coldwater	Rainbow trout Mountain whitefish Kokanee salmon Bull trout	Put-and-take trout General Preservation	Good quality habitat, however limited natural productivity limit wild trout in accessible areas. Maintain stocking if return rates meet 40% goals. Closed to harvest.

Big Smoky Creek from mouth to Calf Creek	4/	Coldwater	Rainbow trout Mountain whitefish Kokanee salmon Bull trout	Put-and-take trout General Preservation	Good quality habitat with wild trout potential. High accessibility gives potential for >30% return on fish. Consider evaluation of adipose fin regulation to allow wild stocks to rebuild and maintain harvest opportunity on catchable rainbow. Closed to harvest.
Big Smoky Creek from Calf Creek to headwaters	15/	Coldwater	Rainbow trout Mountain whitefish Bull trout	Wild trout Preservation	Evaluate social and biological potential for quality management. Emphasize bull trout, self-sustaining rainbow populations. Maintain limited harvest opportunity. Closed to harvest.
Little Smoky Creek	20/	Coldwater	Rainbow trout Bull trout	Put-and-take trout Preservation	Evaluate hatchery program. Closed to harvest.
All other streams in South Fork Boise River drainage upstream from Anderson Ranch Reservoir	277/	Coldwater	Rainbow trout Mountain whitefish Bull trout	Wild trout Preservation	Investigate potentially unique redband trout and ensure survival. Maintain naturally reproducing populations and harvest opportunity. Closed to harvest.
North Fork Boise River from mouth to Rabbit Creek	7/	Coldwater	Rainbow trout Mountain whitefish Bull trout	Wild trout Preservation	Manage for high catch rates (3 fish/hour) and low angler densities. Closed to harvest.
Rabbit Creek to Deer Park (Hunter Creek)	13/	Coldwater	Rainbow trout Mountain whitefish Bull trout	Put-and-take trout Preservation	Manage for high yield and moderate angler densities. Closed to harvest.
Deer Park to headwaters and all tributaries	41/	Coldwater	Rainbow trout Mountain whitefish Bull trout	Wild trout Preservation	Manage for high catch rates (3 fish/hour) and low angler densities. Closed to harvest.
Lucky Peak Reservoir	/2,850	Mixed	Smallmouth bass Yellow perch Rainbow trout Kokanee salmon Mountain whitefish Bull trout	General Preservation	Evaluate status of smallmouth bass fishery. Provide an attractive kokanee salmon fishery for large fish. Investigate feasibility of providing a trout fishery by stocking large numbers of fingerling rainbow in Lucky Peak Reservoir to avoid excessive competition for plankton and jeopardizing quality of kokanee salmon fishery. Continue to stock catchable rainbow trout. Investigate feasibility of introducing lake trout. Closed to harvest.

Arrowrock Reservoir	/4,000	Mixed	Smallmouth bass Yellow perch Rainbow trout Mountain whitefish Bull trout	General Preservation	Seek minimum pool through federal government. Stock annually with fingerling rainbow trout. Closed to harvest.
Lake Lowell	/10,000	Mixed	Largemouth bass Smallmouth bass Channel catfish Bluegill Yellow perch Black crappie Pumpkinseed Rainbow trout Cutthroat trout	Quality General	Determine angler use and harvest rates. Manage bass with primary emphasis on quality fishery. Investigate feasibility of planting Lahontan cutthroat trout.
Anderson Ranch Reservoir	/4,740	Mixed	Rainbow trout Bull trout Mountain whitefish Kokanee salmon Fall chinook salmon Yellow perch Smallmouth bass	General	Emphasize kokanee. Continue developing model to evaluate potential. Goal of 1.0 kokanee/hour with mean size of 12 to 14 inches if productivity allows. Consider fall chinook salmon if kokanee numbers are excessive. Improve trout fishing through hatchery program and public awareness. Maintain smallmouth bass to diversify fishing opportunity.
Little Camas Reservoir	/1,455	Mixed	Rainbow trout Smallmouth bass	General	Use fall fingerling plants to improve carryover in high water years.
Mountain Home Reservoir		Mixed	Rainbow trout Largemouth bass	General	Stock with rainbow trout when water levels allow. Work with irrigation companies to leave conservation pool so trout can overwinter.
Long Tom Reservoir		Coldwater	Rainbow trout	General	Work to secure minimum pool. Establish trophy lake when conservation pool is secure.
Featherville dredge ponds	/3	Coldwater	Rainbow trout	Put-and-take trout	Continue stocking hatchery rainbow trout. Increase numbers to provide 1.0 fish/hour.
Big Trinity Lake	/12	Coldwater	Rainbow trout	Put-and-take trout	Accessible by road. Stock annually with catchables. Stock cutthroat trout fingerlings for diversity.
Little Trinity Lake	/3	Coldwater	Rainbow trout	General	Accessible by road. Stock annually with catchables. Stock cutthroat trout fingerlings for diversity.
Other alpine lakes	/801	Coldwater	Rainbow trout Cutthroat trout Golden trout Brook trout Arctic grayling	General	Put-and-grow for trout and char.